GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. E-21-608 GTRI/~~GTRI~~ DATE 2/4/83

Project Director: K. T. Davey MISC School/~~Lab~~ Elect. Engr.

Sponsor: Veterans Administration Medical Center, Decatur, GA

Type Agreement: Purchase Order No. 508/D30113

Award Period: From 1/3/83 To 6/30/83 (Performance) --- (Reports)

Sponsor Amount: Total Estimated: $ 11,827.98 Funded: $ 11,827.98

Cost Sharing Amount: $ None Cost Sharing No: N/A

Title: Magnetically Induced Electric Fields and the Connection with Inhibitory Regeneration in Kidney Cells

ADMINISTRATIVE DATA OCA Contact William F. Brown x-4820

1) Sponsor Technical Contact: CHANGE TO:
Dr. Child — DR. JOHN R.K. PREEDY
General Surgery — ACOS for R+D
VA Medical Center
1670 Clairmont Road
Decatur, GA 30033

2) Sponsor Admin/Contractual Matters:
Ms. Virginia Watkins
Purchasing
VA Medical Center
1670 Clairmont Road
Decatur, GA 30033
Phone: (404) 321-6111; Ext. 351

Defense Priority Rating: N/A

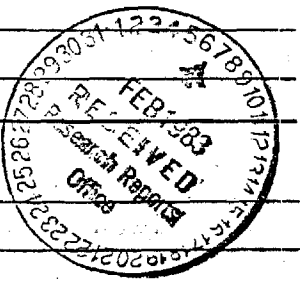
Military Security Classification: _____
(or) Company/Industrial Proprietary: _____

RESTRICTIONS

See Attached --- Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with None proposed



COMMENTS:

COPIES TO:

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GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

N-8-21
SR 1/15

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date January 4, 1984

Project No. E-21-608 School/~~Dept~~ EE

Includes Subproject No.(s)

Project Director(s) K. T. Davey GTRI / ~~GTE~~

Sponsor Veterans Administration Medical Center, Decatur, GA

Title Magnetically Induced Electric Fields and the Connection with Inhibitory Regeneration in Kidney Cells

Effective Completion Date: 6/30/83 (Performance) 6/30/83 (Reports)

Grant/Contract Closeout Actions Remaining:

- [x] None
- [ ] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Continues Project No. Continued by Project No.

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Form OCA 60:1028

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING
ATLANTA, GEORGIA 30332

TELEPHONE: (404) 894-2925

February 3, 1983

Dr. Gardner Child
V. A. Medical Center
1670 Clairmont Road
Decatur, GA 30033

Dear Dr. Child:

Regarding the hepatic cell regeneration research contract initiated 1/1/83, the following list of items summarizes the work accomplished.

1. Designed suitable electromagnet for the proposed experiments on rats; the design is now under review by Cleveland Electric.

2. Implanted osteostem devices in the liver of two dogs.

3. Literature review of work by Basset, Roden, Lee, Veldhussen, and others regarding electric field effects in various tissues.

4. Established source contact for auto-transformer with Technical Power.

5. Designed preliminary specs for the rat cages to be used in the experiment.

Respectfully,

Kent R. Davey

KRD:svs

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING
ATLANTA, GEORGIA 30332

TELEPHONE: (404) 894-2925

March 2, 1983

Dr. C. Gardner Child
Surgical Research
Veterans Administration Medical
Center
1670 Clairmont Road
Decatur, GA 30033

Dear Dr. Child:

During the month of February, the following items were addressed on the hepatic cell regeneration contract (E21-608):

1. Completion of magnetic field excitation device for rats. This includes design of fabrication of plexiglass cage along with equipment and circuitry for the magnetic coils.

2. Help given on contract proposal extension.

3. Consideration of and measurement of permanent magnet fields to be implanted in dog livers.

4. Literature background reading primarily of Bassett and Brighton.

5. Investigation of industrial equipment availability:
microvoltmeter and probes - Hewlett Packard
electromagnet coil fabrication - Cleveland Electric
permanent magnet suppliers - Edmund's Scientific and Bunting.

6. Theoretical work for computer based Electric Field Determination for Osteostem Implants laid with graduate student Jobst Treiber. Initial model being programmed on Cyber at Tech.

Respectfully,

Dr. Kent R. Davey

KRD:svs

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING
ATLANTA, GEORGIA 30332

TELEPHONE: (404) 894-2925

March 30, 1983

Dr. J. R. K. Preedy
1670 Clairmont Road
VA Medical Center/Research
Decatur, GA 30033

Dear Dr. Preedy:

The following items of work were accomplished in the month of March with Dr. C. G. Child on contract E21-608:

1. Direct current plate stimulators fabricated and implanted in two rats. The implants were designed to expose the hepatic cells of the two rats to 0.1 and 1 amp/m^2 of current for two weeks. The implants consisted of a battery, two voltage divider resistors, stainless steel leads (encased in polyethelene tubing) and stainless steel plates; all non-stainless steel exposures are encased in sterile acrylic as pre-operative procedure. (The plates are 1/4" in diameter.)

2. One direct current stimulator fabricated and implanted in a dog; current density was designed for 0.1 amp/m^2 and the plates were 1" in diameter.

3. The 60 Hz electromagnet field generator is now ready for testing on a control and test rat; all heating problems appear to be controllable by air cooling in the laboratory.

4. A three-dimensional finite difference grid has been completed on the Cyber. The results of this analysis portrayed in the form of a three-dimensional potential plot give an estimate of the electric fields resulting from the implants described in (1) and (2). The Cyber implementation was realized by student help from Rolf Treiber.

5. Preliminary invivo potential measurements made in a rat liver; large potentials (20-40 mvolts) encourage further testing with portal vein ligation.

Respectfully,

Dr. Kent R. Davey

KRD:svs

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING
ATLANTA, GEORGIA 30332

TELEPHONE: (404) 894-2925

April 29, 1983

Dr. J. R. K. Preedy
Research
VA Medical Center
1670 Clairmont Road
Decatur, GA 30033

Dear Dr. Preedy:

The following items of work were accomplished in the month of April with Dr. C. G. Child on Contract E21-608:

1. A direct current plate stimulator was fabricated from titanium metal for implant in a dog's liver.

2. The 60 Hz electromagnet field generator has been implemented on a control and test rat. Both were examined two weeks post hepatectomy. The results were negative.

3. The osteostem implant shows slight evidence of stimulating regenerative activity at the cathode in a dog. This is to be followed up with the plate stimulator (Item 1).

4. A differential amplifier circuit has been designed (and is now being constructed) to measure surface potentials invivo without the common mode noise problems observed this month. Two sets of nonpolarizable electrodes have been ordered which should aid in this regard, as well as a digital voltmeter from Hewlett-Packard.

5. A circuit has been designed to realize non-asymmetrical electric field inducement with the electromagnet. Parts are being listed for ordering now.

Respectfully,

Kent R. Davey

KRD:svs

E21-608

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING
ATLANTA, GEORGIA 30332

TELEPHONE: (404) 894-

June 2, 1983

Dr. J. Preedy
Research-Verterans Administration Medical Center
1670 Clairmont Road
Decatur, GA 30033

Dear Dr. Preedy:

The following items of work were completed on contract E21-608:

1) Manufacture of 3 titanium plate stimulators for implant in dogs. Due to difficulty of effectively sealing these devices, implantation has been delayed.

2) Acquisition and testing of silver/silver chloride electrodes and calomel electrodes for measuring surface electrical potentials of tissues insitu.

3) Exploratory search of needle electrodes suitable for potential measurements subcutaneously.

4) Continued debugging work on circuit for measuring potentials with polarizable electrodes.

5) Ordered hardware for construction of pulse generator of electromagnet.

Respectfully,

Dr. Kent Davey

clc

Georgia Institute of Technology
Atlanta, Georgia 30332

College of Engineering
School of Electrical Engineering
Digital Signal Processing Laboratory

July 7, 1983

Dr. J. K. Preedy
Research V. A. Medical Center
1670 Clairmont Road
Decatur, GA 30033

Dear Dr. Preedy:

The following items of work were accomplished during the month of June on contract E-21-608 with Dr. C. G. Child:

1) Finalize the work on the low noise circuitry involving potential measurements invivo. This included ordering special electrodes to measure subcutaneous and surface potentials in animals. Measurement with these electrodes using the new Hewlett-Packard voltmeter is now possible. (One platimum electrode is still on order.)

2) Finalization of work on contract to NIH with Dr. Child.

3) Completion of the power pulsing circuitry to induce electric fields in rats. The objective is to realize an asymmetrical current pulse in time. All the parts are nearly ready but some debugging is yet to be done. Hopefully this will be finalized the first week in July.

Respectfully,

Kent R. Davey
clc